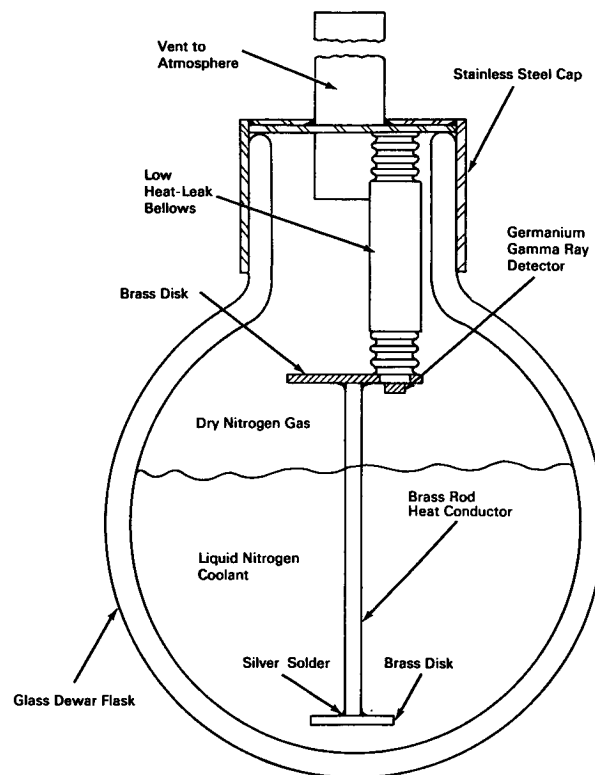


NASA TECH BRIEF



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Mount Makes Liquid Nitrogen-Cooled Gamma Ray Detector Portable



The problem:

Devise a portable liquid nitrogen-cooled gamma ray detector system. Commercially available cryostats that are used to maintain a germanium gamma-ray detector at operating temperature require attachment to a vacuum pump and frequent monitoring and replenishment of the liquid nitrogen coolant. The required external apparatus limits the portability of the detector system.

The solution:

Attach the detector to a fixture that provides a good thermal conductive path between the detector and the liquid nitrogen contained in a Dewar flask, and a low-heat-leak path between the detector and the external environment.

How it's done:

The fixture is comprised of two sections, a thermal conductive section consisting of a brass rod with a

(continued overleaf)

brass disk at each end, and an insulating section consisting of a thin-metal bellows. The upper disk of the brass rod assembly serves as a mount for the germanium gamma-ray detector and the bellows, the upper end of which is fastened to the stainless steel cap on the Dewar flask.

The dry nitrogen gas that accumulates above the liquid nitrogen surrounding the brass rod serves both as a suitable detector environment and as additional thermal insulation for the system. Since the gas is at atmospheric pressure, no external vacuum pump is required. One filling of liquid nitrogen in a two-liter Dewar flask will effectively cool the detector for approximately six days.

Notes:

1. The gamma ray source outside of the flask must be at or above the level of the coolant.
2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio, 44135
Reference: B66-10103

Patent status:

No patent action is contemplated by NASA.

Source: Theodore E. Fessler
(Lewis-259)